Feedback — Problem Set-5

Help Center

You submitted this quiz on **Sat 21 Nov 2015 7:55 AM PST**. You got a score of **4.00** out of **5.00**. You can attempt again in 1 minutes.

Question 1

Consider a directed graph with distinct and nonnegative edge lengths and a source vertex s. Fix a destination vertex t, and assume that the graph contains at least one s-t path. Which of the following statements are true? [Check all that apply.]

Your Answer		Score	Explanation
☑ There is a shortest s-t path with no repeated vertices (i.e., a "simple" or "loopless" such path).	✔	0.25	
☑ The shortest (i.e., minimum-length) s-t path might have as many as $n-1$ edges, where n is the number of vertices.	✔	0.25	
☐ The shortest s-t path must include the minimum-length edge of G.	✔	0.25	
☐ The shortest s-t path must exclude the maximum-length edge of G.	✔	0.25	
Total		1.00 / 1.00	

Question 2

Consider a directed graph $G=(V,E)$ and a source vertex s with the following properties: edges that leave the source vertex s have arbitrary (possibly negative) lengths; all other edge lengths are nonnegative; and there are no edges from any other vertex to the source s. Does Dijkstra's shortest-path algorithm correctly compute shortest-path distances (from s) in this graph?

Your Answer		Score	Explanation
Always	✔	1.00	One approach is to see that the proof of correctness from the videos still works. A slicker solution is to notice that adding a positive constant M to all edges incident to s increases the length of every s-v path by exactly M, and thus preserves the shortest path.
Never			
Only if we add the assumption that G contains no directed cycles with negative total weight.			
Maybe, maybe not (depends on the graph)			
Total		1.00 / 1.00	

Question 3

Suppose you implement the functionality of a priority queue using a *sorted* array (e.g., from biggest to smallest). What is the worst-case running time of Insert and Extract-Min, respectively? (Assume that you have a large enough array to accommodate the Insertions that you face.)

Your Answer		Score	Explanation
$\Theta(1)$ and $\Theta(n)$			
$\Theta(n)$ and $\Theta(n)$	✖	0.00	
$\Theta(\log n)$ and $\Theta(1)$			
$\Theta(n)$ and $\Theta(1)$			

Total	0.00 / 1.00

Question 4

Suppose you implement the functionality of a priority queue using an *unsorted* array. What is the worst-case running time of Insert and Extract-Min, respectively? (Assume that you have a large enough array to accommodate the Insertions that you face.)

Your Answer		Score	Explanation
$\Theta(1)$ and $\Theta(n)$	✔	1.00	
$\Theta(n)$ and $\Theta(1)$			
$\Theta(n)$ and $\Theta(n)$			
$\Theta(1)$ and $\Theta(\log n)$			
Total		1.00 / 1.00	

Question 5

You are given a heap with n elements that supports Insert and Extract-Min. Which of the following tasks can you achieve in $O(\log n)$ time?

Your Answer		Score	Explanation
Find the median of the elements stored in the heap.			
None of these.			
Find the largest element stored in the heap.			
Find the fifth-smallest element stored in the heap.	✔	1.00	
Total		1.00 / 1.00	